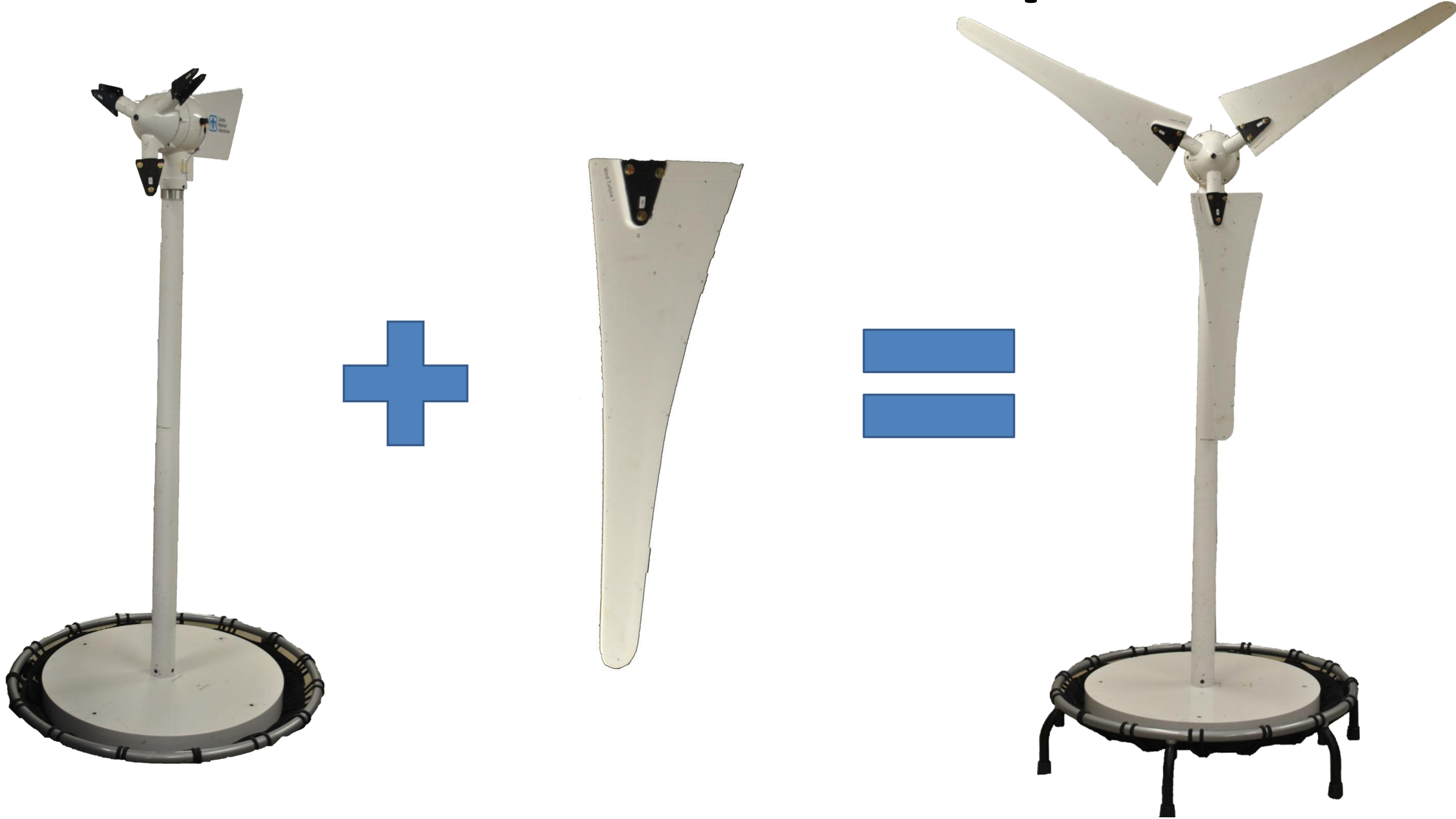


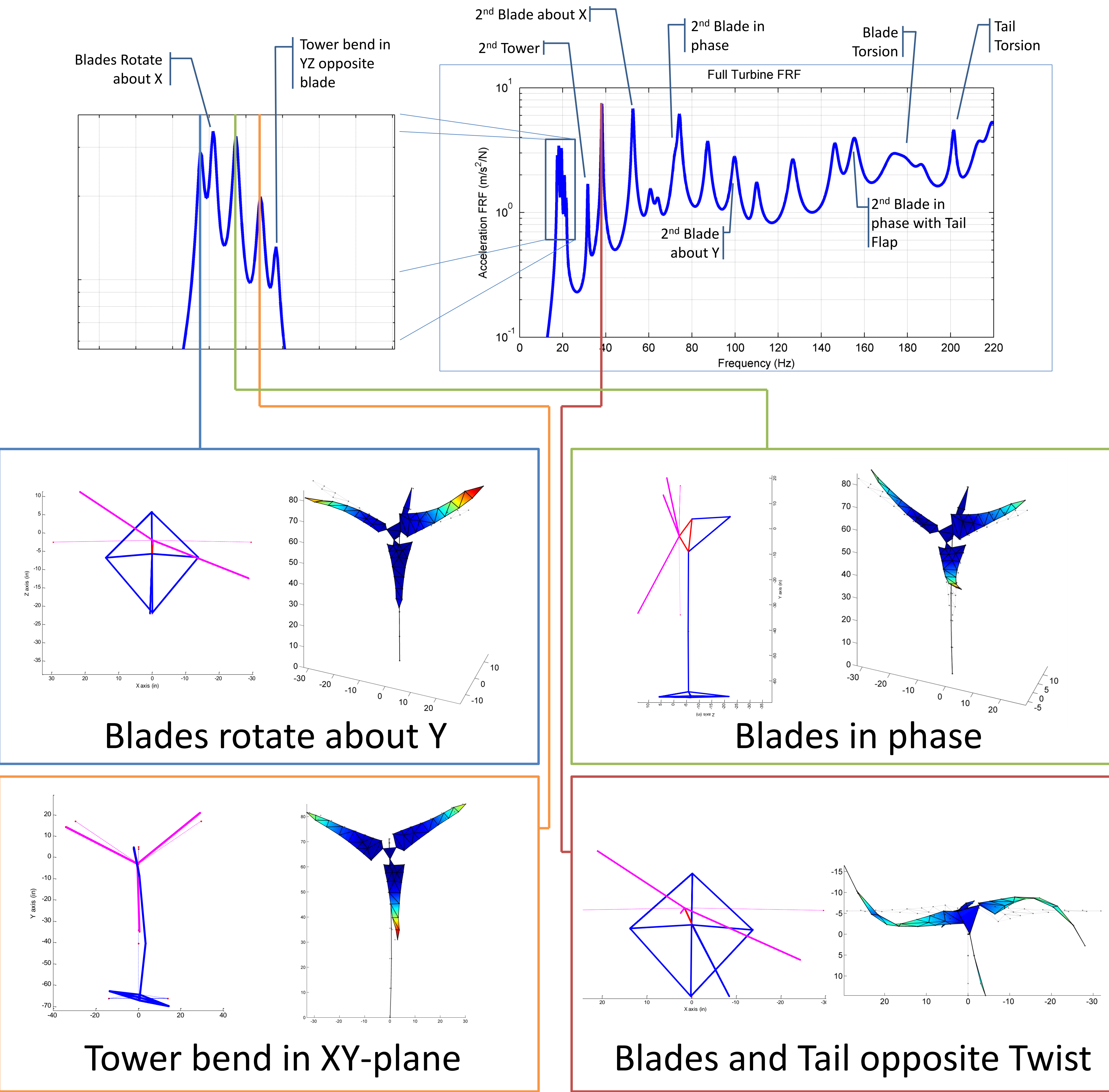
Ampair 600 Test Bed for Dynamic Substructures Focus Group – SEM



The experimental dynamic substructures focus group organized last year with over 20 researchers from around the world. Sandia National Laboratories has developed 2 test beds, based on the Ampair 600 commercial wind turbine, to perform experimental dynamic substructuring research and development. These are available for loan. The Technical University of Delft, University of Stuttgart and Chalmers University have also bought Ampair 600 turbines to develop equivalent test beds.



Sandia National Laboratories and the University of Wisconsin – Madison have performed initial impact tests of the two SNL test beds. Some mode shapes are shown below. The spread on the frequencies and damping of these modes for three tests are given in the table.

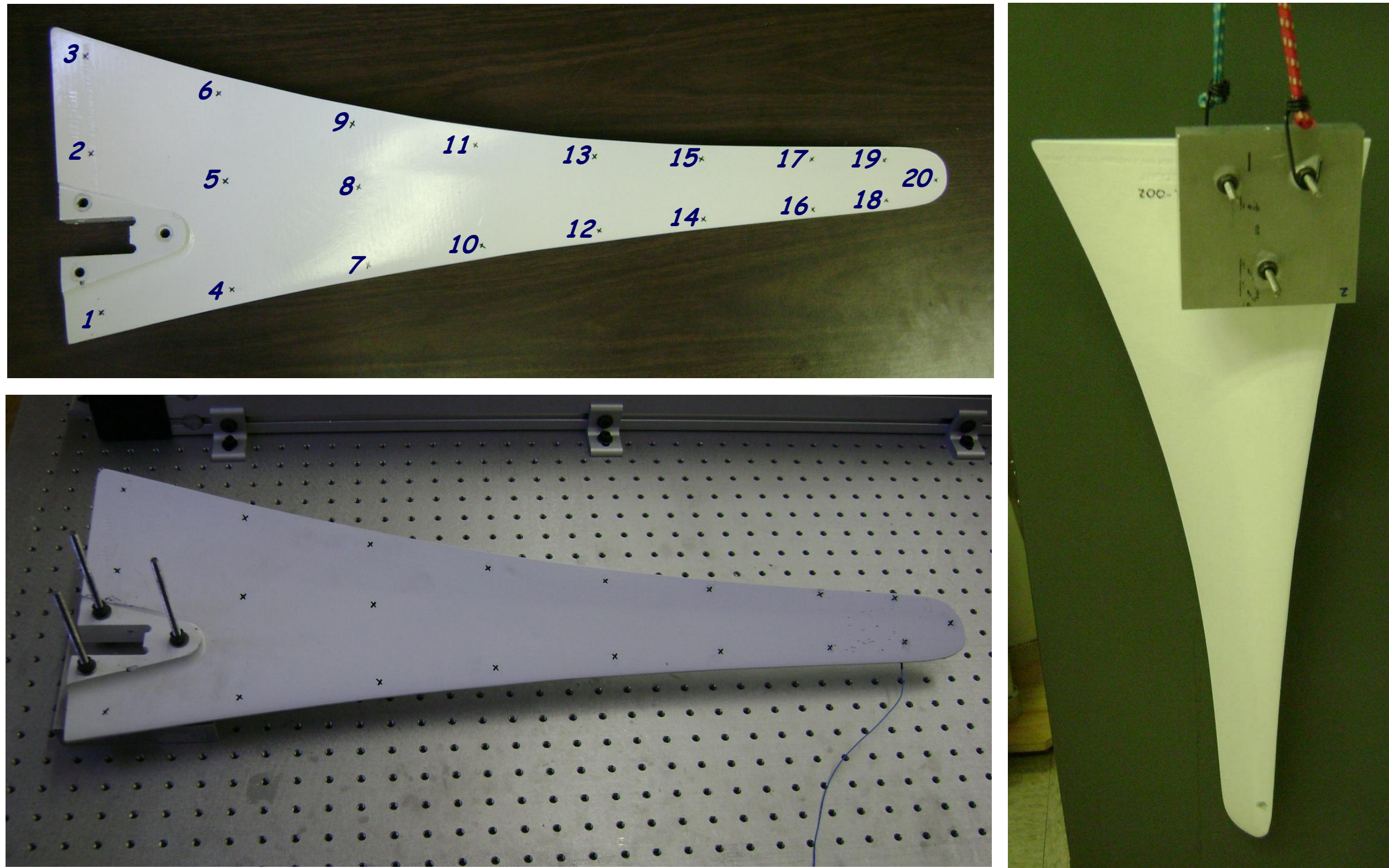
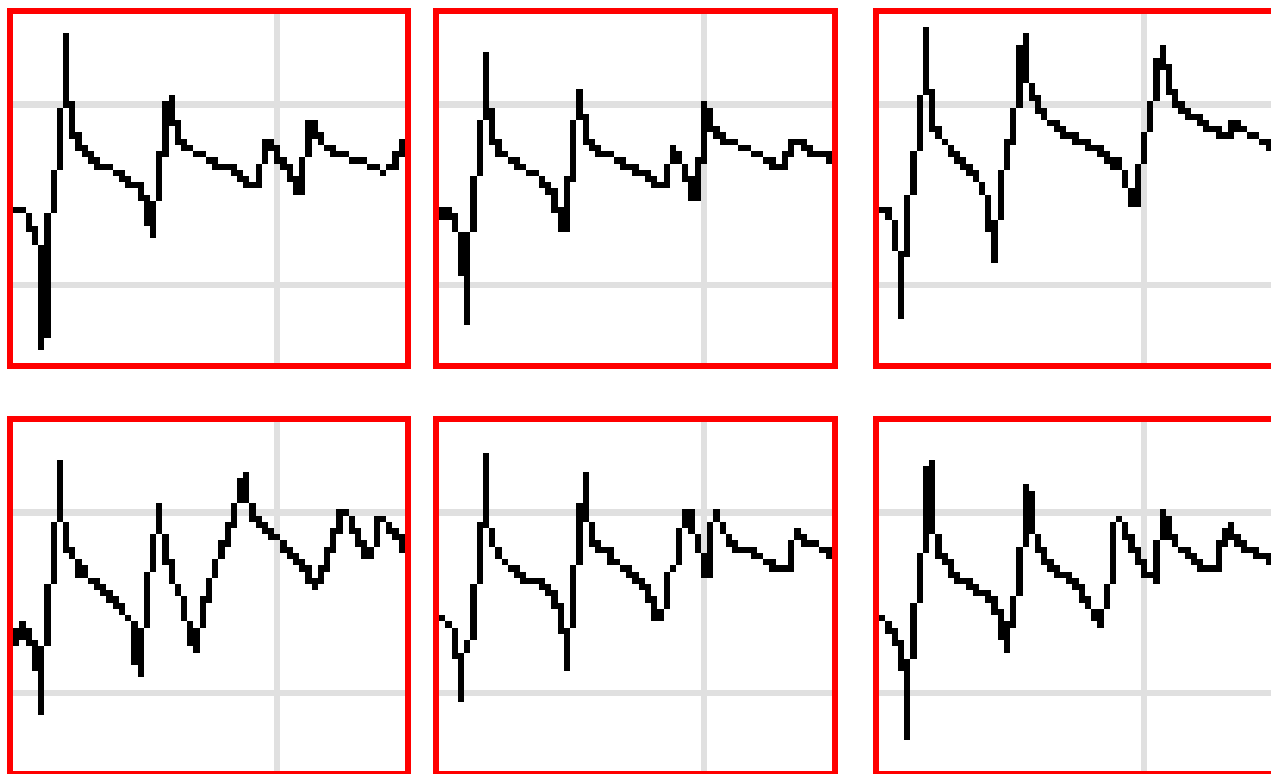


Description	Frequencies - Hz	Damping %
Blades rotate about Y	16.97 – 17.53	0.8 - 1.7
Blades rotate about X	17.68 – 18.22	0.74 - 1.8
Blades in phase	18.76 – 19.46	0.8 - 1.9
Tower bend in Y	20.4 – 20.8	0.95 - 1.7
Blades and tail	37.12 – 38.19	0.54 - 1.5

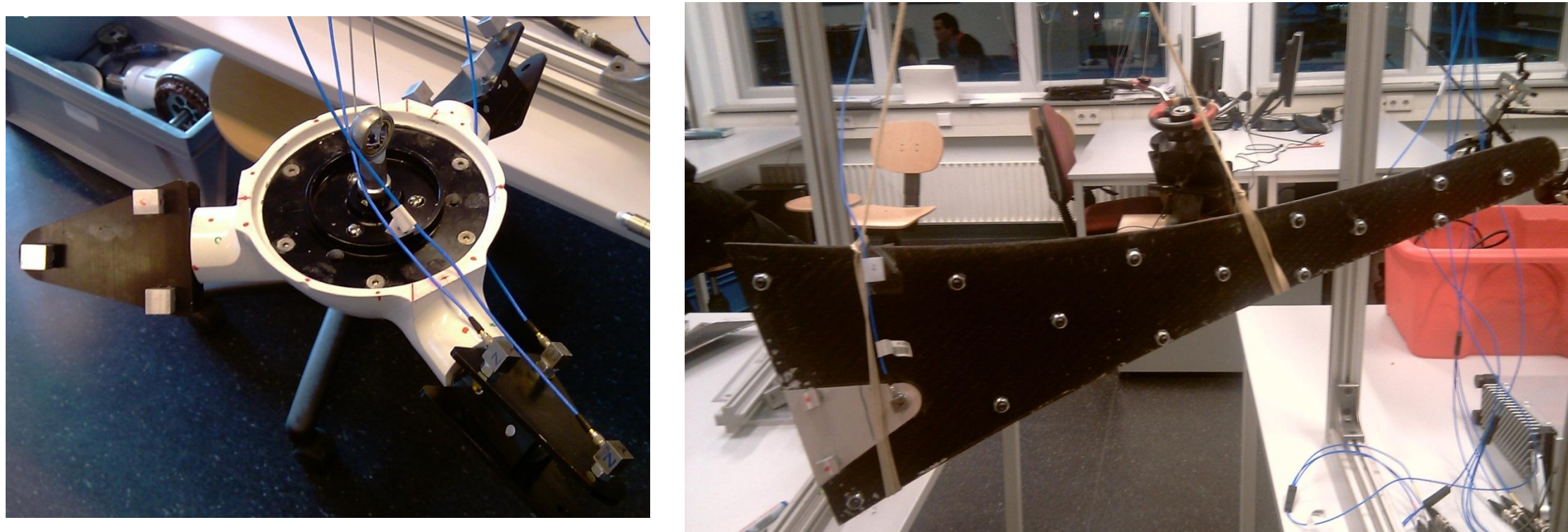
The Atomic Weapons Establishment , UK has developed solid and finite element models of a blade and performed free blade modal tests using a scanning laser Doppler velocimeter.

University of Massachusetts – Lowell has performed modal tests on 6 of the blades. The spread on the frequencies for these blades in a near cantilevered configuration is shown in the table.

Mode	Frequencies - Hz
1	37.0 - 41.8
2	107.4 – 119.7
3	171.9 – 187.9
4	199.1 – 223.0
5	245.4 – 288.2



TU-Delft has performed preliminary substructuring calculations attempting to assemble the turbine hub to three blades.



The University of Wisconsin has also performed tests on the SNL test bed with one and all of the blades removed, with the goal of assembling the blade(s) to the turbine.

